WE CLAIM:

1. A vulcanizable rubber composition comprising a reinforcing white filler, which can be used for the manufacture of a tire, wherein the rubber composition comprises a diene block copolymer which is intended to interact with said reinforcing white filler, said diene block copolymer comprising on at least one end thereof a polysiloxane block which ends in a trialkylsilyl group, said polysiloxane block corresponding to the formula:

$$[-(SiR_1R_2O)-]x-SiR_3R_4R_5,$$

in which R_1, R_2, R_3, R_4 and R_5 each represent alkyl groups having from 1 to 20 carbon atoms, and in which x is a natural integer other than zero.

2. A rubber composition according to Claim 1, wherein said diene block copolymer comprises styrene-butadiene units.

3. A rubber composition according to Claim 1, wherein said polysiloxane block comprises a polydimethylsiloxane.

4. A rubber composition according to Claim 1, wherein said trialkylsilyl group comprises a butyl group.

5. A rubber composition according to Claim 1, wherein said polysiloxane block has a molecular weight of between 500 and 5,000 g/mol.

6. A rubber composition according to Claim 1, wherein said reinforcing white filler comprises greater than 50% of the mass fraction of reinforcing filler in the rubber composition.

7. A rubber composition according to Claim 6, wherein said reinforcing white filler further comprises carbon black in an amount of less than or equal to 30% of the mass fraction of said reinforcing filler.

8. A rubber composition according to Claim 1, wherein said reinforcing white filler comprises silica.

9. A rubber composition according to Claim 1, wherein the composition comprises a blend of natural rubber and said diene block copolymer, wherein the natural rubber comprises from 1 to 70 parts by weight per 100 parts by weight of said diene block copolymer.

10. A rubber composition according to Claim 1, wherein the composition comprises a blend of a synthetic elastomer and/or a starred diene elastomer and diene block copolymer, wherein said synthetic elastomer and/or starred diene elastomer comprises from 1 to 70 parts by weight per 100 parts by weight of said diene block copolymer.

11. A process for the preparation of a rubber composition comprising a reinforcing white filler, wherein the rubber composition comprises a diene block copolymer which is intended to interact with said reinforcing white filler, said diene block copolymer comprising on at least one end thereof a polysiloxane block which ends in a trialkylsilyl group, said polysiloxane block corresponding to the formula:

$$[-(SiR_1R_2O)-]x-SiR_3R_4R_5,$$

in which R_1, R_2, R_3, R_4 and R_5 represent alkyl groups having from 1 to 20 carbon atoms, and in which x is a natural integer other than zero,

wherein the process comprises

(a) reacting a living diene polymer with a functionalized polysiloxane comprising at one of its chain ends a halo-organosilane function and, at its other chain end, a trialkylsilyl group, to produce said diene block copolymer comprising said polysiloxane block which ends in a trialkylsilyl group, and

(b) mixing, by thermomechanical working, said diene block copolymer with silica, and with conventional additives for obtaining a vulcanizable rubber composition.

12. A process according to Claim 11, further comprising grafting on said living diene polymer another polymer which comprises said polysiloxane that has been obtained anionically with an initiator comprising an alkyl group as carbanion to obtain the diene block copolymer.

13. A process according to Claim 11 or 12, wherein the diene polymer comprises a homopolymer obtained by polymerization of a conjugated diene monomer having 4 to 12 carbon atoms.

14. A process according to Claim 11 or 12, wherein the diene polymer comprises a copolymer obtained by copolymerization of one or more dienes which are conjugated together, or with one or more vinyl aromatic compounds having 8 to 20 carbon atoms, said copolymer containing 20% to 99% by weight of diene units, and 1 to 80% by weight of vinyl aromatic units.

15. A process according to Claim 12, wherein said initiator comprises an alkyllithium or a lithium amide.

16. A process according to Claim 11 or 12, further comprising preparing said polysiloxane by polymerizing a cyclic siloxane initiated by an organolithium compound to form a polysiloxane, and functionalizing said polysiloxane with a dihalo-organosilane.

17. A preparation process according to Claim 16, wherein the cyclic siloxane is hexamethylcyclotrisiloxane, the initator is n-butyllithium and the functionalizing agent is dichlorodimethylsilane.

18. A tire, characterized in that it comprises a tread containing a rubber composition according to one of Claims 1 to 10.